

INSTALLATION RESTORATION PROGRAM

PRELIMINARY ASSESSMENT

222nd Combat Communications Squadron

Costa Mesa Air National Guard Station
California Air National Guard
Costa Mesa, California

December 1990

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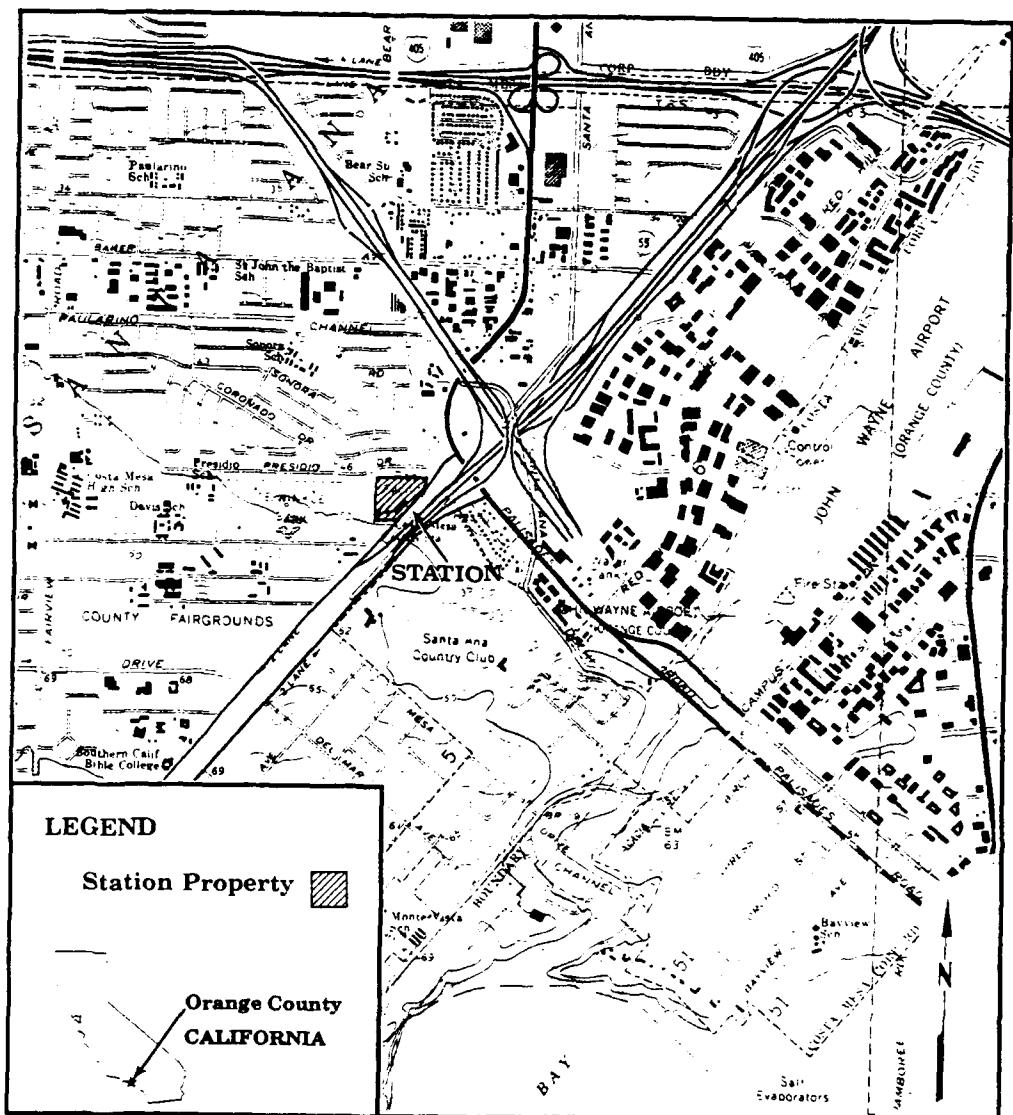


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INSTALLATION RESTORATION PROGRAM
PRELIMINARY ASSESSMENT

222nd COMBAT COMMUNICATIONS SQUADRON
COSTA MESA AIR NATIONAL GUARD STATION
CALIFORNIA AIR NATIONAL GUARD
COSTA MESA, CALIFORNIA

Prepared for

National Guard Bureau
Andrews Air Force Base, Maryland 20331-6008



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Prepared by

Science & Technology, Inc.
704 South Illinois Avenue
Suite C-103
Oak Ridge, Tennessee 37830
Contract No. DE-AC05-87OR21704

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Submitted to

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December 1990

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ACRONYM LIST

AGE	Aerospace Ground Equipment
CCSQ	Combat Communications Squadron
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
EO	Executive Order
EPA	Environmental Protection Agency
FR	Federal Register
FS	Feasibility Study
HAS	Hazard Assessment Score
HAZWRAP	Hazardous Waste Remedial Actions Program
IRP	Installation Restoration Program
MOGAS	Automotive Gasoline
Nddb	National Diversity Data Base
NGB	National Guard Bureau
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
PL	Public Law
POC	Point of Contact
RCRA	Resource Conservation and Recovery Act of 1976
R&D	Research and Development
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
SciTek	Science & Technology, Inc.
SI	Site Investigation
USAF	United States Air Force
USC	United States Code
UTA	Unit Training Assembly

EXECUTIVE SUMMARY

A. INTRODUCTION

Science & Technology, Inc. (SciTek) was retained to conduct the Installation Restoration Program (IRP) Preliminary Assessment (PA) of the 222nd Combat Communications Squadron (CCSQ), Costa Mesa Air National Guard Station [hereinafter referred to as the Station] located at Costa Mesa, California. For the purpose of this document, the Station shall include the total area leased by the 222nd CCSQ at Costa Mesa, California.

The PA included the following activities:

- o an on-site visit, including interviews with a total of 11 persons familiar with Station operations, and field surveys by SciTek representatives during April 23 through May 4, 1990;
- o acquisition and analysis of information on past hazardous materials use, waste generation, and waste disposal at the Station;
- o acquisition and analysis of available geological, hydrological, meteorological, and environmental data from federal, state, and local agencies; and
- o the identification and assessment of sites on the Station that may have been contaminated with hazardous wastes.

B. MAJOR FINDINGS

The 222nd CCSQ has used hazardous materials and generated small amounts of wastes in mission-oriented operations and maintenance at the Station since 1964.

Operations that have involved the use of hazardous materials and the disposal of hazardous wastes include vehicle maintenance and maintenance of aerospace ground equipment (AGE). The hazardous wastes disposed of through these operations include varying quantities of fuels, acids, paints, thinners, strippers, solvents, and oils.

The field surveys and interviews resulted in no sites being identified that exhibit the potential for contaminant presence and migration.

C. CONCLUSIONS

It has been concluded there are no sites where a potential for contaminant presence exists.

D. RECOMMENDATIONS

No further work under the IRP is recommended.

I. INTRODUCTION

A. Background

The 222nd Combat Communications Squadron (CCSQ), Costa Mesa Air National Guard Station [hereinafter referred to as the Station] is located at Costa Mesa, California. The 222nd CCSQ has been active at its present location since 1964. Both the past and current operations have involved the use of potentially hazardous materials and the disposal of wastes. Because of the use of these materials and the disposal of resultant wastes, the National Guard Bureau (NGB) has implemented the Installation Restoration Program (IRP).

The IRP is a comprehensive program designed to:

- o Identify and fully evaluate suspected problems associated with past hazardous waste disposal and/or spill sites on Department of Defense (DoD) installations and
- o Control hazards to human health, welfare, and the environment that may have resulted from these past practices.

During June 1980, DoD issued a Defense Environmental Quality Program Policy Memorandum (DEQPPM 80-6) requiring identification of past hazardous waste disposal sites on DoD installations. The policy was issued in response to the Resource Conservation and Recovery Act of 1976 (RCRA) and in anticipation of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, Public Law (PL) 96-510), commonly known as "Superfund." In August 1981, the President delegated certain authority specified under CERCLA to the Secretary of Defense via an Executive Order (EO 12316). As a result of EO 12316, DoD revised the IRP by issuing DEQPPM 81-5 (December 11, 1981), which reissued and amplified all previous directives and memoranda.

Although the DoD IRP and the Environmental Protection Agency (EPA) Superfund programs were essentially the same, differences in the definition of program activities and lines of authority resulted in some confusion between DoD and state/federal regulatory agencies. These difficulties were rectified via passage of the Superfund Amendments and Reauthorization Act (SARA, PL-99-499) of 1986. On January 23, 1987, Presidential Executive Order EO 12580 was issued. EO 12580 effectively revoked EO 12316 and implemented the changes promulgated by SARA.

The most important changes effected by SARA included the following:

- o Section 120 of SARA provides that federal facilities, including those in DoD, are subject to all provisions of CERCLA/SARA concerning site assessment, evaluation under the National Contingency Plan [40CFR300], listing on the National Priorities List, and removal/remedial actions. DoD must therefore comply with all the procedural and substantive requirements (guidelines, rules, regulations, and criteria) promulgated by the EPA under Superfund authority.
- o Section 211 of SARA also provides continuing statutory authority for DoD to conduct its IRP as part of the Defense Environmental Restoration Program (DERP). This was accomplished by adding Chapter 160, Sections 2701-2707 to Title 10 United States Code (10 USC 160).
- o SARA also stipulated that terminology used to describe or otherwise identify actions carried out under the IRP shall be substantially the same as the terminology of the regulations and guidelines issued by the EPA under their Superfund authority.

As a result of SARA, the operational activities of the IRP are currently defined and described as follows:

- o **Preliminary Assessment**

The Preliminary Assessment (PA) process consists of personnel interviews and a records search designed to identify and evaluate past disposal and/or spill sites that might pose a potential and/or actual hazard to public health, public welfare, or the environment. Previously undocumented information is obtained through the interviews. The records search focuses on obtaining useful information from aerial photographs; Station plans; facility inventory documents; lists of hazardous materials used at the Station; Station subcontractor reports; Station correspondence; Material Safety Data Sheets; federal/state agency scientific reports and statistics; federal administrative documents; federal/state records on endangered species, threatened species, and critical habitats; documents from local government offices; and numerous standard reference sources.

- o **Site Inspection/Remedial Investigation/Feasibility Study**

The Site Inspection consists of field activities designed to confirm the presence or absence of contamination at the potential sites identified in the PA. An expanded Site Inspection has been designed by the Air National Guard as a Site Investigation. The Site Investigation (SI) will include additional field tests and the installation of monitoring wells to

provide data from which site-specific decisions regarding remediation actions can be made. The activities undertaken during the SI fall into three distinct categories: screening activities, confirmation and delineation activities, and optional activities. Screening activities are conducted to gather preliminary data on each site. Confirmation and delineation activities include specific media sampling and laboratory analysis to confirm either the presence or the absence of contamination, levels of contamination, and the potential for contaminant migration. Optional activities will be used if additional data is needed to reach a decision point for a site. The general approach for the design of the SI activities is to sequence the field activities so that data are acquired and used as the field investigation progresses. This is done in order to determine the absence or presence of contamination in a relatively short period of time, optimize data collection and data quality, and to keep costs to a minimum.

The Remedial Investigation (RI) consists of field activities designed to quantify and identify the potential contaminant, the extent of the contaminant plume, and the pathways of contaminant migration.

If applicable, a public health evaluation is performed to analyze the collected data. Field tests, which may necessitate the installation of monitoring wells or the collection and analysis of water, soil, and/or sediment samples, are required. Careful documentation and quality control procedures in accordance with CERCLA/SARA guidelines ensure the validity of data. Hydrogeologic studies are conducted to determine the underlying strata, groundwater flow rates, and direction of contaminant migration. The findings from these studies result in the selection of one or more of the following options:

1. **No Further Action** - Investigations do not indicate harmful levels of contamination that pose a significant threat to human health or the environment. The site does not warrant further IRP action, and a Decision Document will be prepared to close out the site.
2. **Long-Term Monitoring** - Evaluations do not detect sufficient contamination to justify costly remedial actions. Long-term monitoring may be recommended to detect the possibility of future problems.
3. **Feasibility Study** - Investigation confirms the presence of contamination that may pose a threat to human health and/or the environment, and some sort of remedial action is indicated. The Feasibility Study (FS) is therefore designed and developed to identify and select the most appropriate remedial action. The FS may include individual sites, groups of sites, or all sites on an

installation. Remedial alternatives are chosen according to engineering and cost feasibility, state/federal regulatory requirements, public health effects, and environmental impacts. The end result of the FS is the selection of the most appropriate remedial action with concurrence by state and/or federal regulatory agencies.

- o **Remedial Design/Remedial Action**

The Remedial Design involves formulation and approval of the engineering designs required to implement the selected remedial action. The Remedial Action is the actual implementation of the remedial alternative. It refers to the accomplishment of measures to eliminate the hazard or, at a minimum, reduce it to an acceptable limit. Covering a landfill with an impermeable cap, pumping and treating contaminated groundwater, installing a new water distribution system, and in situ biodegradation of contaminated soils are examples of remedial measures that might be selected. In some cases, after the remedial actions have been completed, a long-term monitoring system may be installed as a precautionary measure to detect any contaminant migration or to document the efficiency of remediation.

- o **Research and Development**

Research and Development (R&D) activities are not always applicable for an IRP site but may be necessary if there is a requirement for additional research and development of control measures. R&D tasks may be initiated for sites that cannot be characterized or controlled through the application of currently available, proven technology. It can also, in some instances, be used for sites deemed suitable for evaluating new technologies.

- o **Immediate Action Alternatives**

At any point, it may be determined that a former waste disposal site poses an immediate threat to public health or the environment, thus necessitating prompt removal of the contaminant. Immediate action, such as limiting access to the site, capping or removing contaminated soils, and/or providing an alternate water supply may suffice as effective control measures. Sites requiring immediate removal action maintain IRP status in order to determine the need for additional remedial planning or long-term monitoring. Removal measures or other appropriate remedial actions may be implemented during any phase of an IRP project.

B. Purpose

The purpose of this IRP PA is to identify and evaluate suspected problems associated with past waste handling procedures, disposal sites, and spill sites on Station property.

The potential for migration of hazardous contaminants was evaluated by visiting the Station, reviewing existing environmental data, analyzing Station records concerning the use of hazardous materials and the generation of hazardous wastes, and conducting interviews with current Station personnel who had knowledge of past waste disposal techniques and handling methods. Pertinent information collected and analyzed as part of the PA included a records search of the history of the Station; the local geological, hydrological, and meteorological conditions that might influence migration of contaminants; and ecological settings that indicate environmentally sensitive conditions.

C. Scope

The scope was limited to the identification of sites at or under primary control of the Station and evaluation of potential receptors. The PA included:

- o an on-site visit and field surveys during the period April 23 through May 4, 1990;
- o acquisition of records and information on hazardous materials use and waste handling practices;
- o acquisition of available geological, hydrological, meteorological, land use and zoning, critical habitat, and related data from federal and state agencies;
- o a review and analysis of all information obtained; and
- o preparation of a summary report to include recommendations for further action.

The subcontractor effort was conducted by the following Science & Technology, Inc. (SciTek) personnel: Mr. Ray S. Clark, Civil/Environmental Engineer; Mr. P. J. McMullen, Geologist/Hydrogeologist; and Mr. Jack D. Wheat, Geologist. Ms. Carol Ann Beda of the NGB is Project Officer for this Station and participated in the overall assessment during the Station visit. Mr. Bob Combs of the Hazardous Waste Remedial Actions Program (HAZWAP) also participated in the Station visit.

The point of contact (POC) at the Station was Major Judith A. Giglio (Detachment Commander).

D. Methodology

The PA began with a visit to the Station to identify all operations that may have utilized hazardous materials or may have generated hazardous wastes. Figure I.1 is a flow chart of the PA methodology. A total of 11 current and past Station employees familiar with the various operating procedures were interviewed. These interviews were conducted to determine those areas where waste materials (hazardous or nonhazardous) were used, spilled, stored, disposed of, or released into the environment. The interviewees' knowledge and experience with Station operations averaged 14 years and ranged from 2 to 26 years. Records contained in the Station files were collected and reviewed to supplement the information obtained from the interviews.

Detailed geological, hydrological, meteorological, and environmental data for the area were obtained from the appropriate federal and state agencies. A listing of federal and state agency contacts is included as Appendix A.

After a detailed analysis of all the information obtained, it was concluded that the Station has no sites potentially contaminated with hazardous wastes. Under the IRP program, when sufficient information is available, sites are numerically scored and assigned a Hazard Assessment Score (HAS) using a hazard assessment rating methodology. However, the absence of a HAS does not necessarily negate a recommendation for further IRP investigation, but rather, may indicate a lack of data.

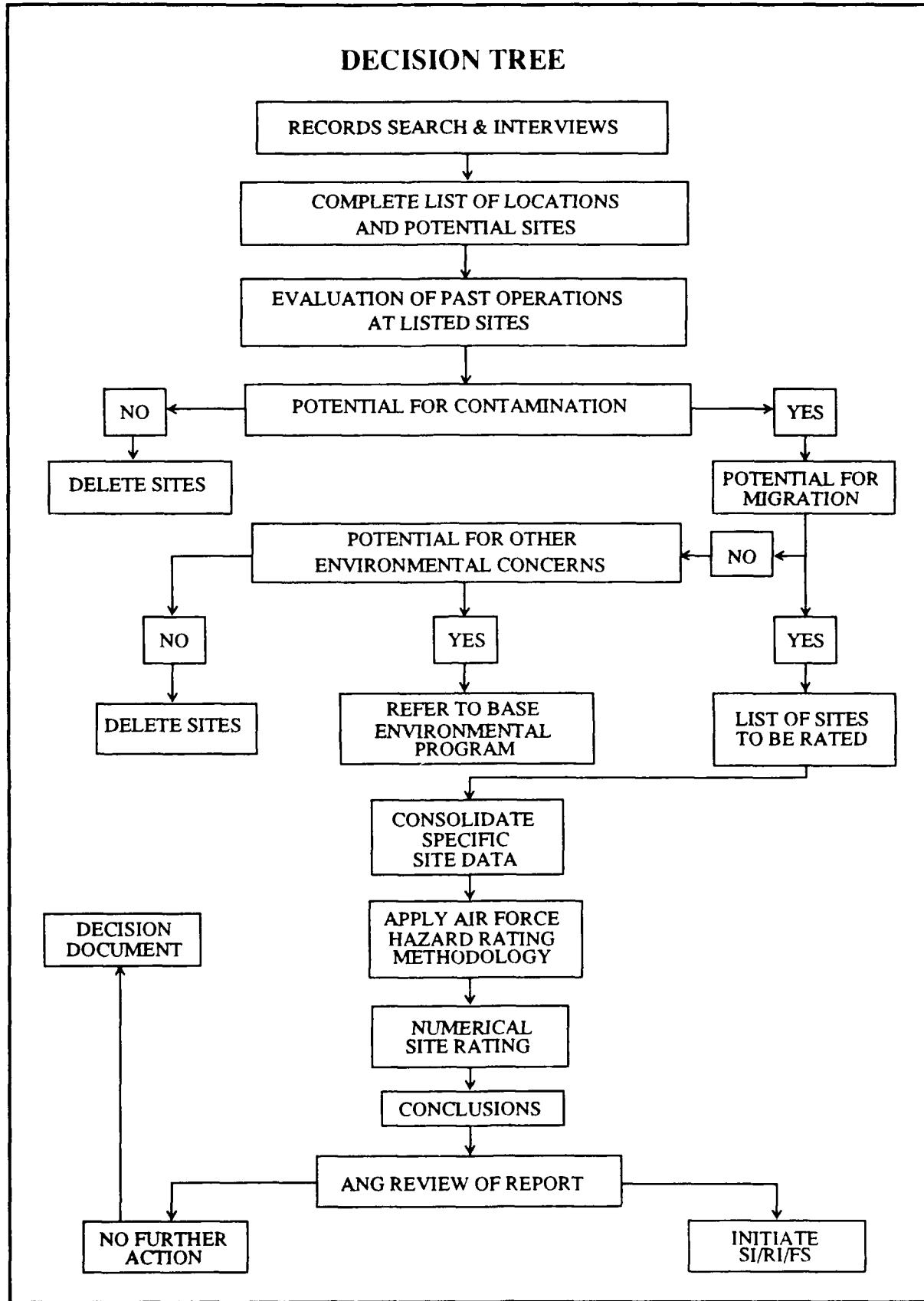


Figure I.1
Preliminary Assessment Methodology Flow Chart

II. INSTALLATION DESCRIPTION

A. Location

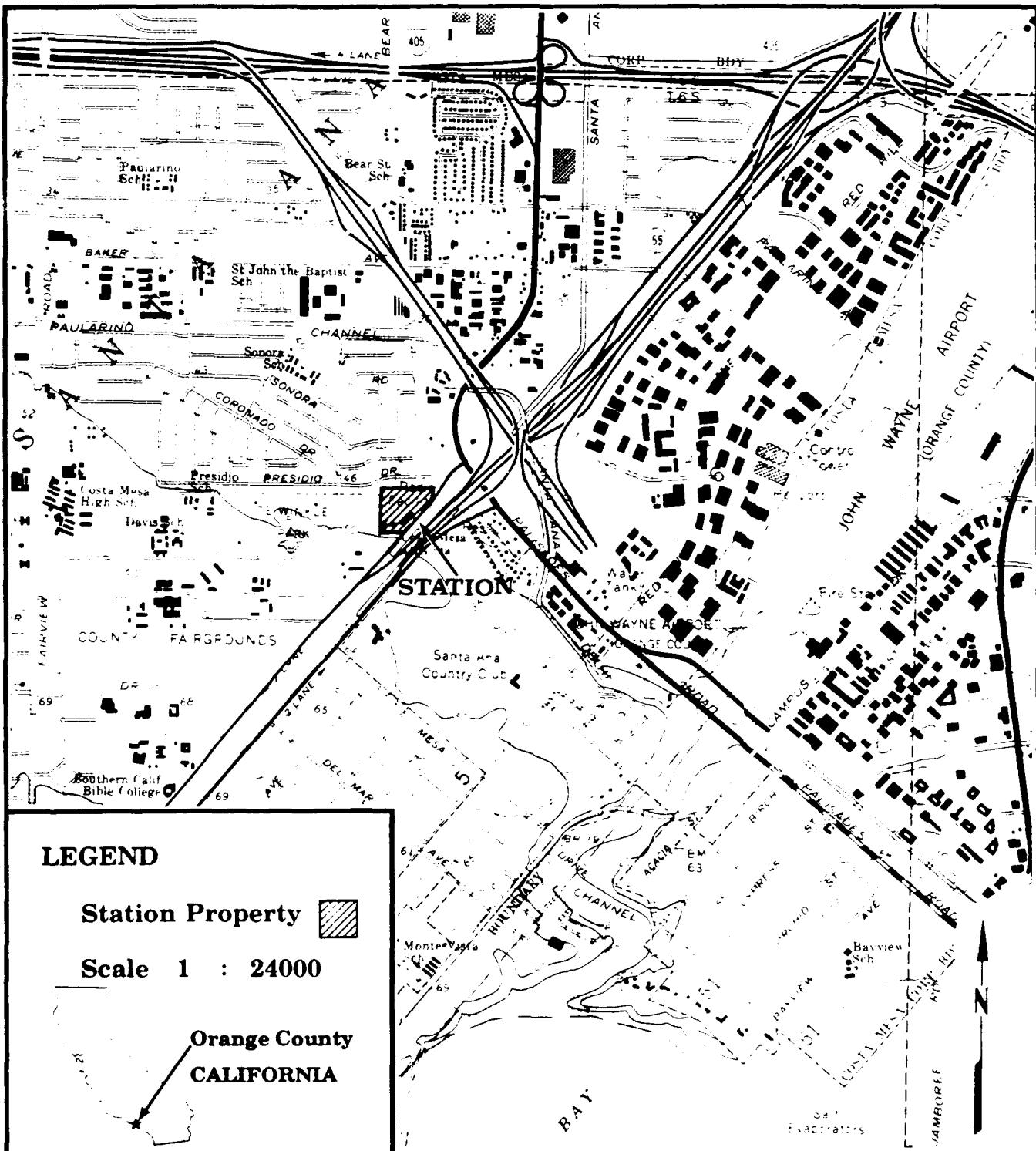
The Station is located approximately 2 miles north of Upper Newport Bay and about 1.5 miles west of John Wayne Airport within Orange County, California. The major routes to the Station include Corona Del Mar Freeway (Highway 73) and Newport Freeway (Highway 55).

The Station occupies approximately 8 acres along Newport Boulevard. Figure II.1 illustrates the location and boundaries of the Station. On weekdays, the population at the Station is approximately 26. Unit Training Assembly (UTA) occurs one weekend per month. The Station population during this weekend is approximately 159. The Station is completely fenced with controlled access. The unimproved acreage is used to conduct training and for parking of equipment.

B. Organization and History

The 222nd CCSQ is located on former Santa Ana Army Air Base property which occupied approximately 1300 acres during the 1940s and through the 1950s. The operations that took place at this Army Air Base are not known. Also, it is unknown how hazardous materials were handled and disposed of while the Army was at this location. The Station's 8.5 acre site was completed and dedicated in March 1964 and has occupied the property since that time.

The Unit's mission is to provide communications support for national disasters and in wartime, if needed. This mission necessitates routine maintenance of vehicles, generators, and various ground equipment. The Unit maintains a fleet of up to 40 vehicles and 35 portable generators that create the bulk of the hazardous wastes requiring disposal at the Station. Hazardous wastes resulting from these maintenance activities include varying amounts of waste fuels, oils, paints, thinners, and solvents. Through the years, hazardous materials at the Station have been collected and disposed of either through a contractor or the Defense Reutilization and Marketing Office (DRMO) at El Toro.



SOURCE: USGS, Newport Beach Quad, N3335-W11752/10x7.5; Tustin Quad, N3337.5-W11745/7.5, 1965 (photo revised 1981).

Figure II.1
Location Map of
the Costa Mesa Air National Guard Station

III. ENVIRONMENTAL SETTING

A. Meteorology

The following climatological data is taken from Climatography of the United States No. 81 - California (U.S. Department of Commerce, National Climate Center, Asheville, N.C., 1982) and Climatic Atlas of the United States (U.S. Department of Commerce, National Climatic Center, Asheville, N.C., 1979). Using Newport Beach Harbor (4-6175) and Santa Ana Fire Station (4-7888) data, the average annual temperature for the Station during the 29 year period of 1951-1980 was 62.2°F. The average monthly temperatures ranged from a low of 55.1°F in January to a high of 70.8°F in August.

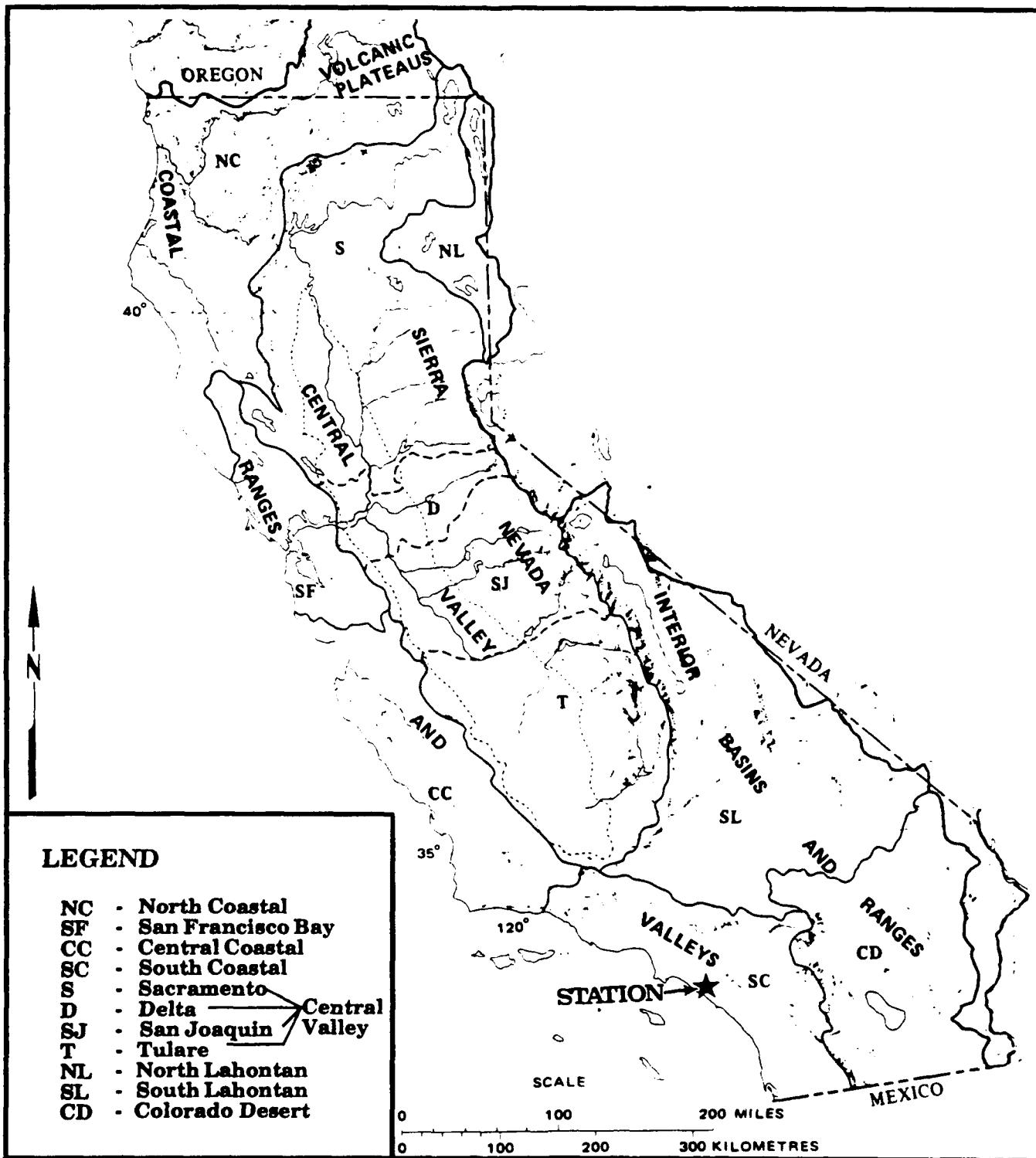
With the moderating effect of the Pacific Ocean, most rainfall occurs between November and March and yields an average precipitation of 12 inches per year. Annual lake evaporation equals 46 inches per year. Mean annual lake evaporation minus average annual precipitation yields a net precipitation of -34 inches per year (47 FR 31224 July 16, 1982). Maximum rainfall intensity, based on a 1-year, 24-hour rainfall, is 3.1 inches (47 FR 31235 July 16, 1982, Figure No.8).

B. Geology

The Station has an elevation of 48 feet above sea level and is located on a local structural high, the Newport Mesa, with surface slopes of 25 feet per mile to the east/southeast into the Upper Newport Bay/Newport Bay drainage basin.

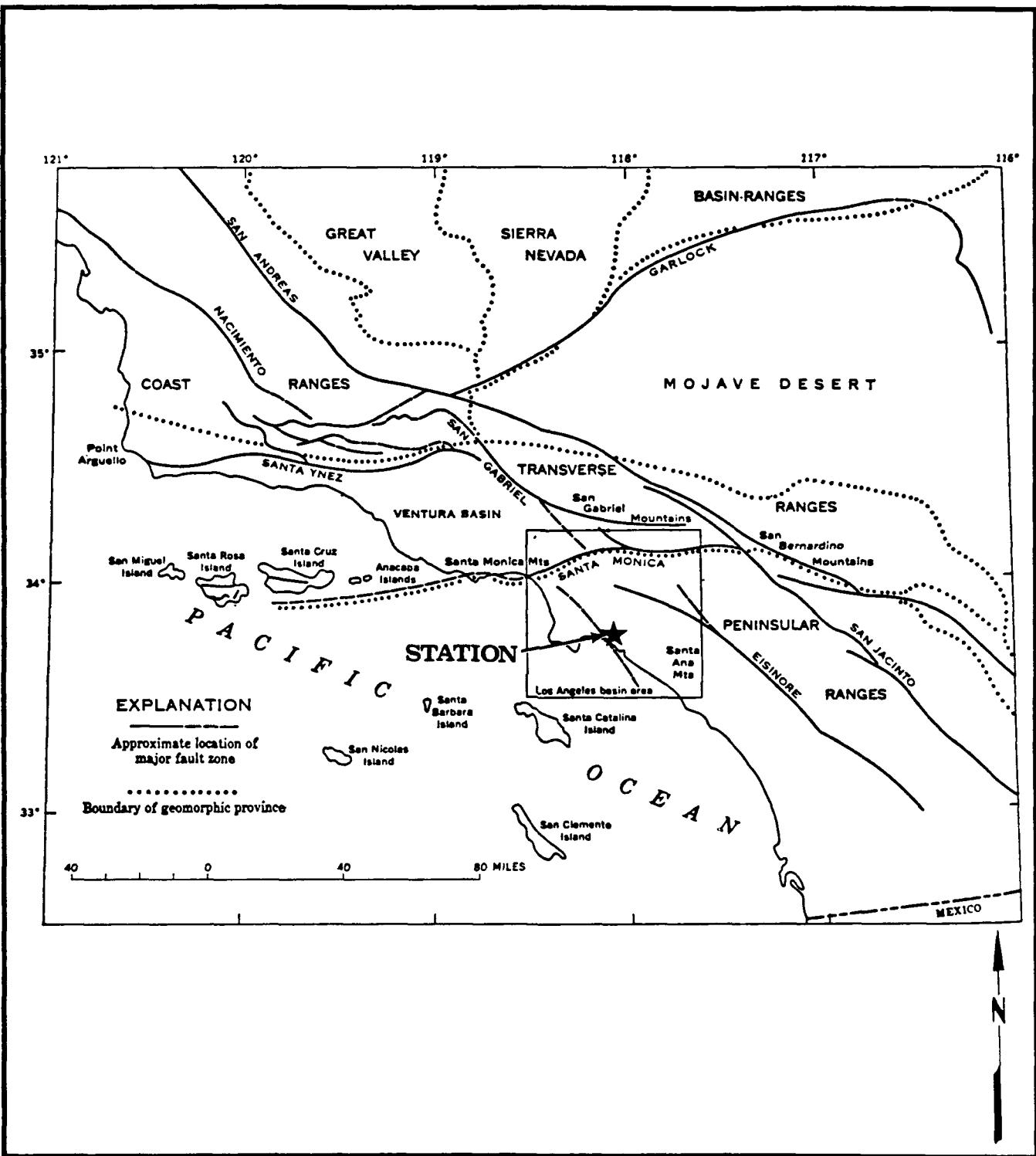
Yerkes, 1965, describes the southern Coastal California area as including parts of three geomorphic provinces: the Coastal Ranges, the Transverse Ranges, and the Peninsular Ranges (Figures III.1, III.2A). The western parts of all three provinces are submerged under the Pacific Ocean. The present day Los Angeles Basin, which includes the Station, is at the north end of the Peninsula Ranges province. The physiographic basin is bounded on the east and southeast by the Santa Ana Mountains and the San Joaquin Hills; on the northwest, it is bounded by the Santa Monica Mountains of the east-trending Transverse Ranges province and the accompanying east-trending zone of faults.

The backbone of the Peninsular Ranges province is an elongate series of Northwest trending mountain ridges separated both offshore and onshore by straight-sided sediment-floored valleys (Figure III.2B). The onshore portion of the province is 55 to 80 miles wide and has been uplifted, tilted seaward, and sliced longitudinally into subparallel blocks by young steeply dipping northwest-trending fault zones like the Newport-Inglewood zone. These elongate subparallel blocks stand at different structural elevations; the faulting either



SOURCE: USGS, Summary Appraisals of Nation's Ground Water Resources-California Region, Professional Paper 812-E, 1976.

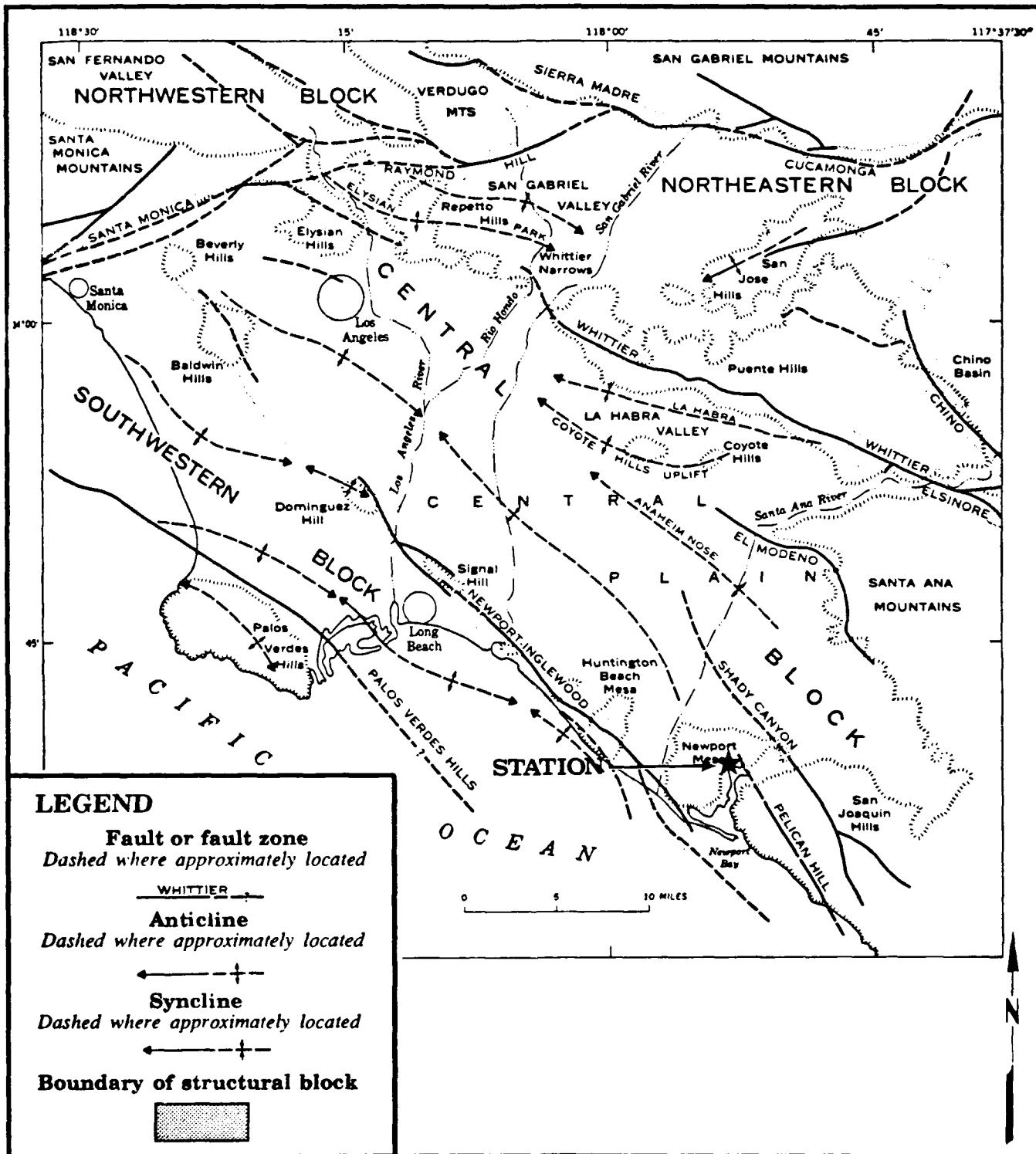
Figure III.1
Physiographic Map of California



SOURCE: Yerkes, R. F., et al. Geology of the Los Angeles Basin, California - An Introduction. USGS Professional Paper 420A.

Figure III.2A

Regional Geomorphic/Structural Map



SOURCE: Yerkes, R. F., et al., Geology of the Los Angeles Basin, California - An Introduction, USGS Professional Paper 420A.

Figure III.2B
Local
Structural/Physiographic Map

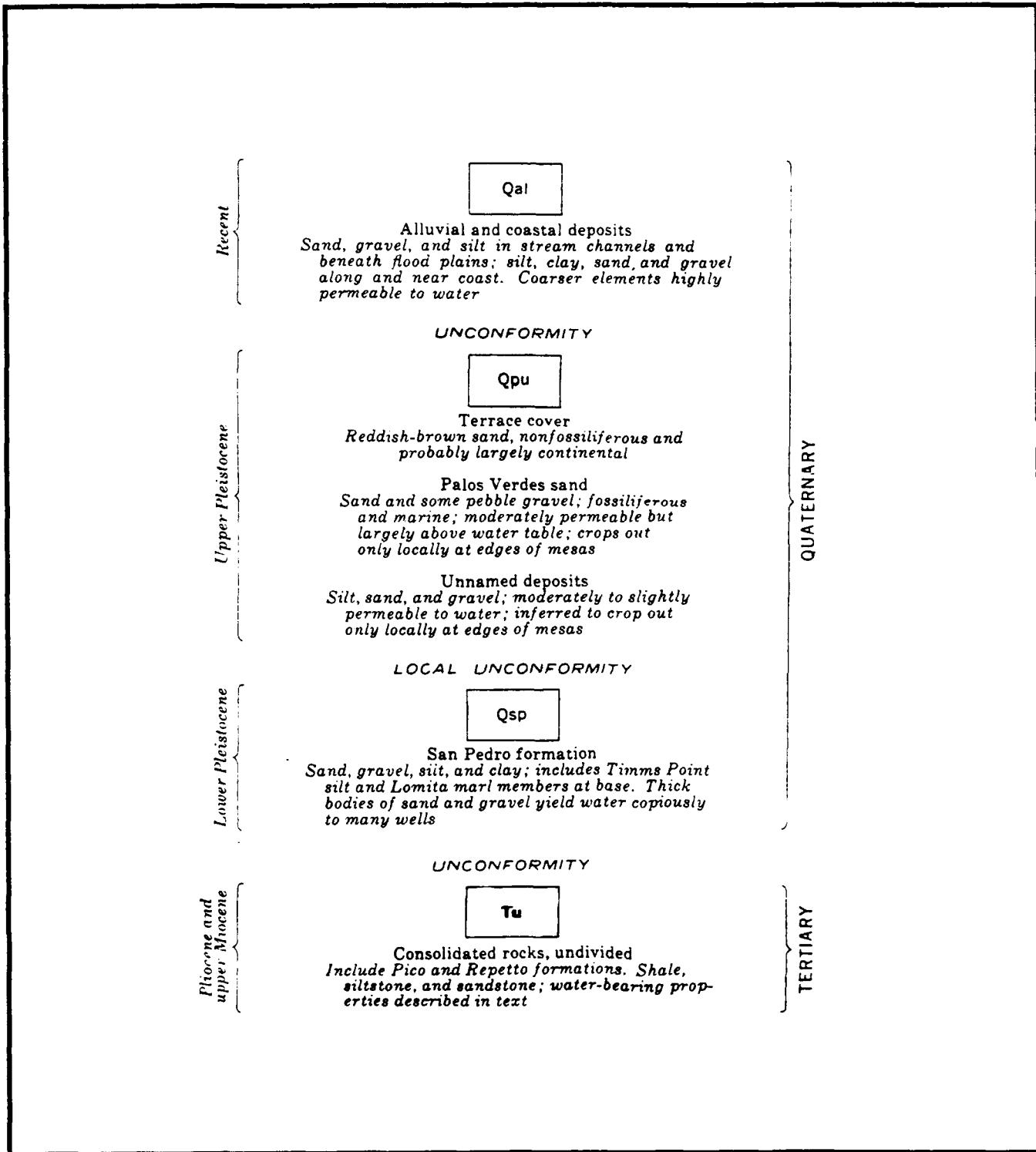
dies out to the northwest or merges with or terminates into the steep east-trending faults of the southern margin of the Transverse Ranges.

Both offshore and onshore portions of the province have late Cretaceous or Cenozoic marine and nonmarine clastic strata overlying basement rocks. A belt of clastic strata is present along the Coast, from San Diego to Los Angeles, and exceeds 32,000 feet in thickness, in the subsurface, south-southeast of downtown Los Angeles (Yerkes, 1965).

Contrasting or partly contrasting rocks occur in four large subdivisions of the Los Angeles Basin. Each subdivision is also a structural block separated from adjoining blocks by faulting with either intermittent vertical and or lateral movement.

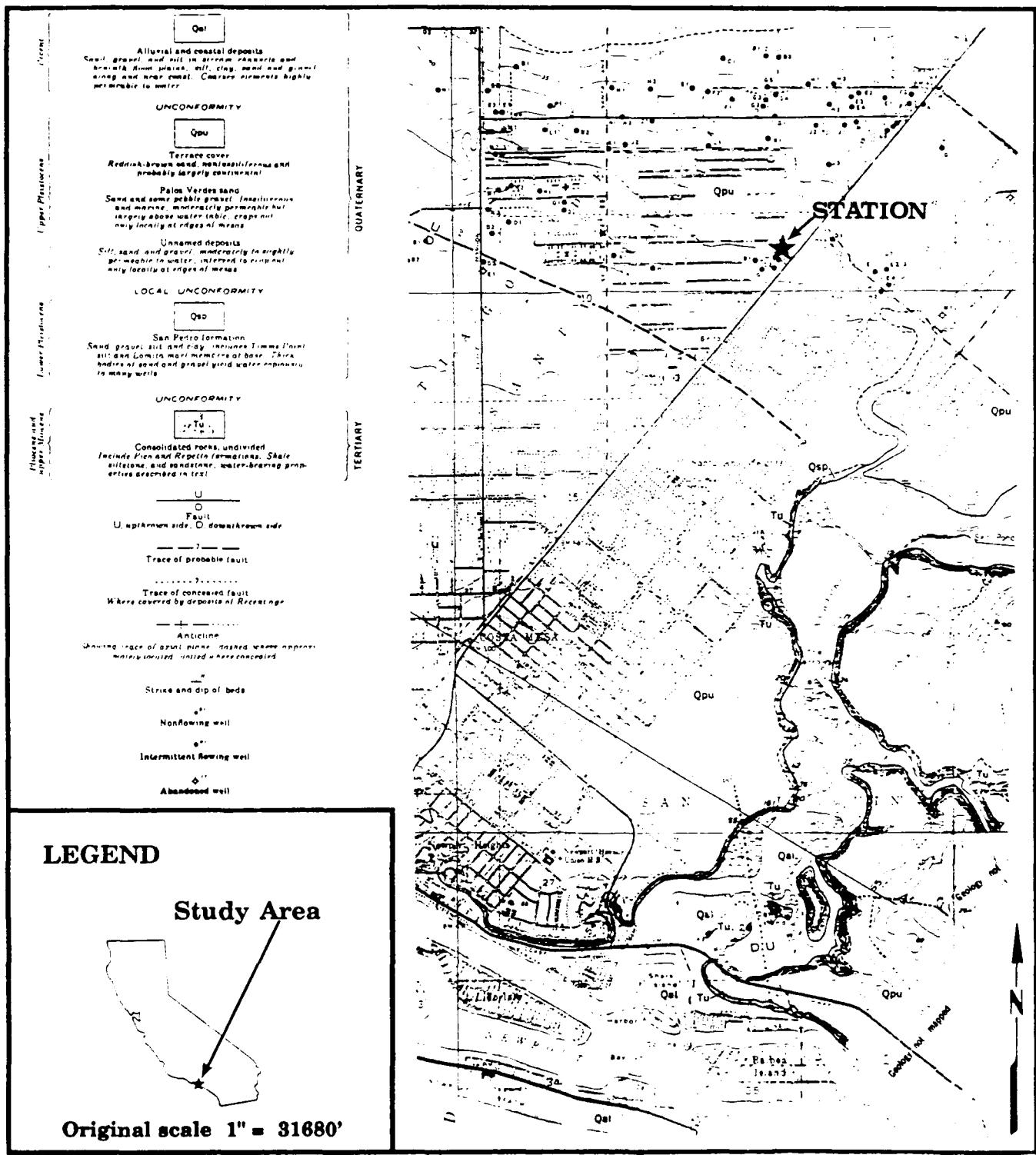
The Station is located in the south-southwestern portion of the Central Block that lies a few miles inland from the Newport-Anglewood fault zone and which marks the boundary of the Southwestern Block. In this vicinity, the pre-Cenozoic basement is at approximately 15,000 feet and is overlain mainly by Quaternary Pleistocene and Recent deposits (Figure III.3). The Upper Pleistocene sediments are, for the most part, terrace sands of probable nonmarine origin. In the lower portions of the Newport Bay drainage shed, recent alluvial and coastal deposits such as silt, clay, sand, and gravel are common. The lower Pleistocene San Pedro Formation is a series of heterogeneous sand/gravel wedges that yield large volumes of water to many wells. The older Pliocene and Upper Miocene Pico and Repetto Formations, which are shales, siltstones, and sandstones, also have water-bearing properties (Figure III.4).

The Myford soil series, which underlies the Station, is a very slowly permeable (less than 4.24×10^{-5} cm/sec) sandy loam with 2 to 9% slopes. This gently sloping to moderately sloping soil has a 4 inch thick surface layer that is a pale brown and pinkish gray, medium acid sandy loam. The subsurface layer is 8 inches thick and consists of a pinkish gray, medium acid sandy loam. The subsoil is approximately 59 inches thick and consists of 6 inches of brown, neutral and moderately alkaline sandy clay loam; the lower 36 inches of this subsoil is light brown, calcareous sandy clay loam and sandy loam. The information pertaining to soils contained in the text was derived from the Soil Survey of Orange County and Western Part of Riverside County, California (United States Department of Agriculture, Soil Conservation Service and Forest Service, September 1978).



SOURCE: Poland, J. F., Hydrology of the Long Beach-Santa Ana Area, California, USGS Water Supply Paper 1471.

Figure III.3
Generalized Stratigraphic Column of the Area



SOURCE: Poland, J. F., *Hydrology of the Long Beach-Santa Ana Area, California*. USGS Water Supply Paper 1471.

Figure III.4
Surficial Geologic Map of the Area

C. Hydrology

1. Surface Water

The Station is located in the Upper Newport Bay/Newport Bay drainage basin. Surface water drains to the east-southeast through storm drains into the basin (Figure III.5). The Station has been classified as located outside the 100-year flood plain of the Upper Newport Bay/Newport Bay and Santa Ana River basins. Areal drainage in the vicinity of the Station is shown in Figure III.6.

2. Groundwater

The main source of water in Orange County, California is imported from the Colorado river, and a major portion of this water is used to recharge the groundwater supply, especially water pumped from the Santa Ana River recharge area along the north-northwest flanks of the Santa Ana Mountains. In these upland (inland) areas, the main water-bearing zones of the Pleistocene age are assigned to the San Pedro Formation. They range from a feather edge in the Forebay area to more than 3000 feet thickness in the downdip pressure area beneath the Station and the Newport Mesa. Well data from four downdip wells, within 600 feet of the Station, indicate that the San Pedro Formation is a heterogeneous wedge of silt, sand, and gravel. The top of the Pleistocene aquifers range in depth from 336 feet to 532 feet below ground surface and have an average thickness of 179 feet (Poland, 1951). Water levels are approximately 8 to 12 feet above mean sea level (Figure III.7). Moreland and Singer, 1969, state that saltwater intrusion along the Pacific Coast is a major problem and that a large portion of the Newport Mesa is underlain by water of poor and/or potentially poor quality (Figure III.7).

D. Critical Habitats/Endangered or Threatened Species

Within a 1-mile radius of the Station, records maintained by the California Department of Fish and Game, Natural Diversity Data Base (NDDB), indicate that no endangered or threatened species of flora and fauna have been identified.

Nevertheless, it must be pointed out that surface runoff from the site empties into Upper Newport Bay/Newport Bay wetlands which are within a 1 1/2-mile radius of the Station.

A list of endangered or threatened species and natural areas follows.

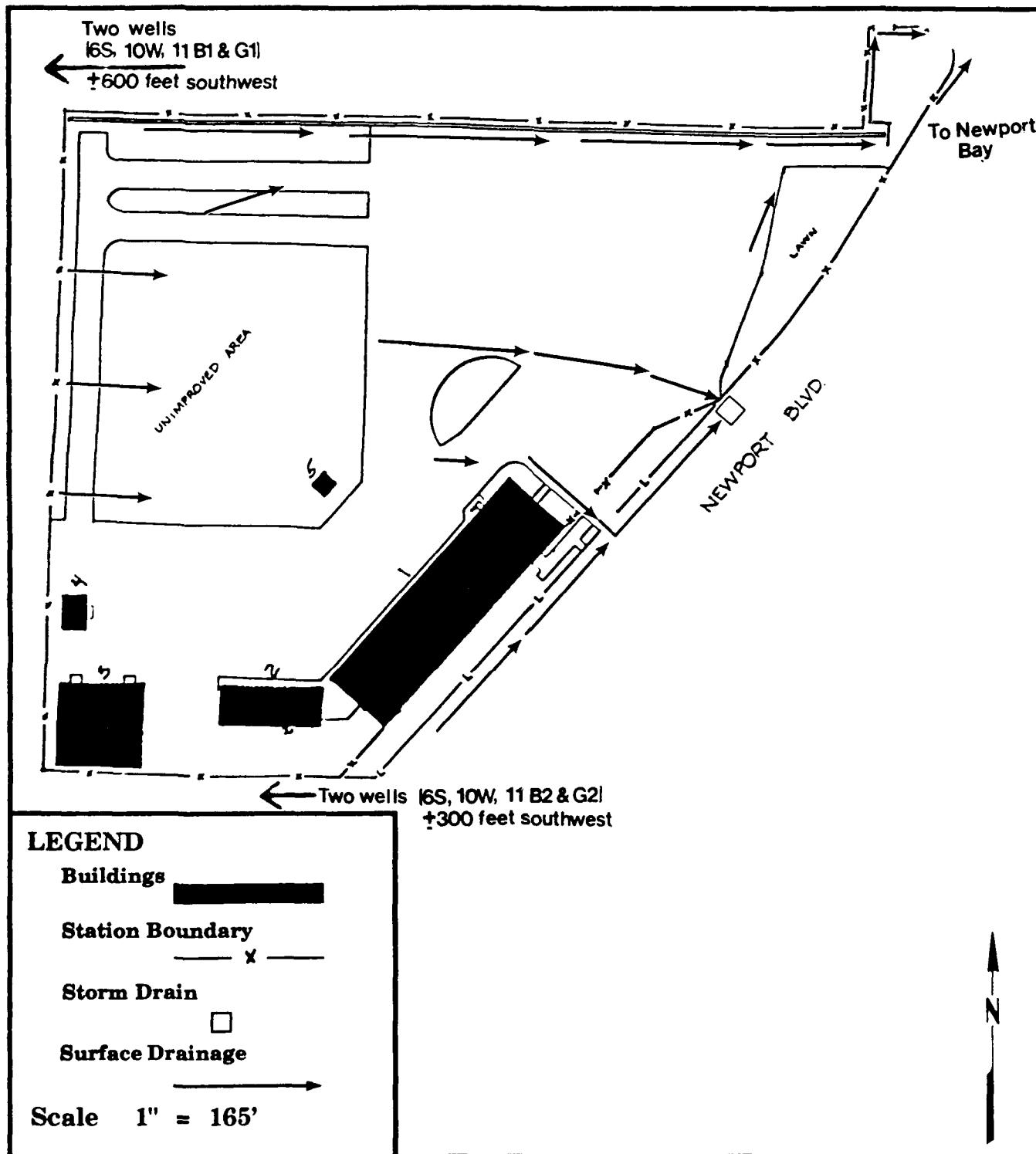


Figure III.5
Drainage Map
of the Costa Mesa Air National Guard Station

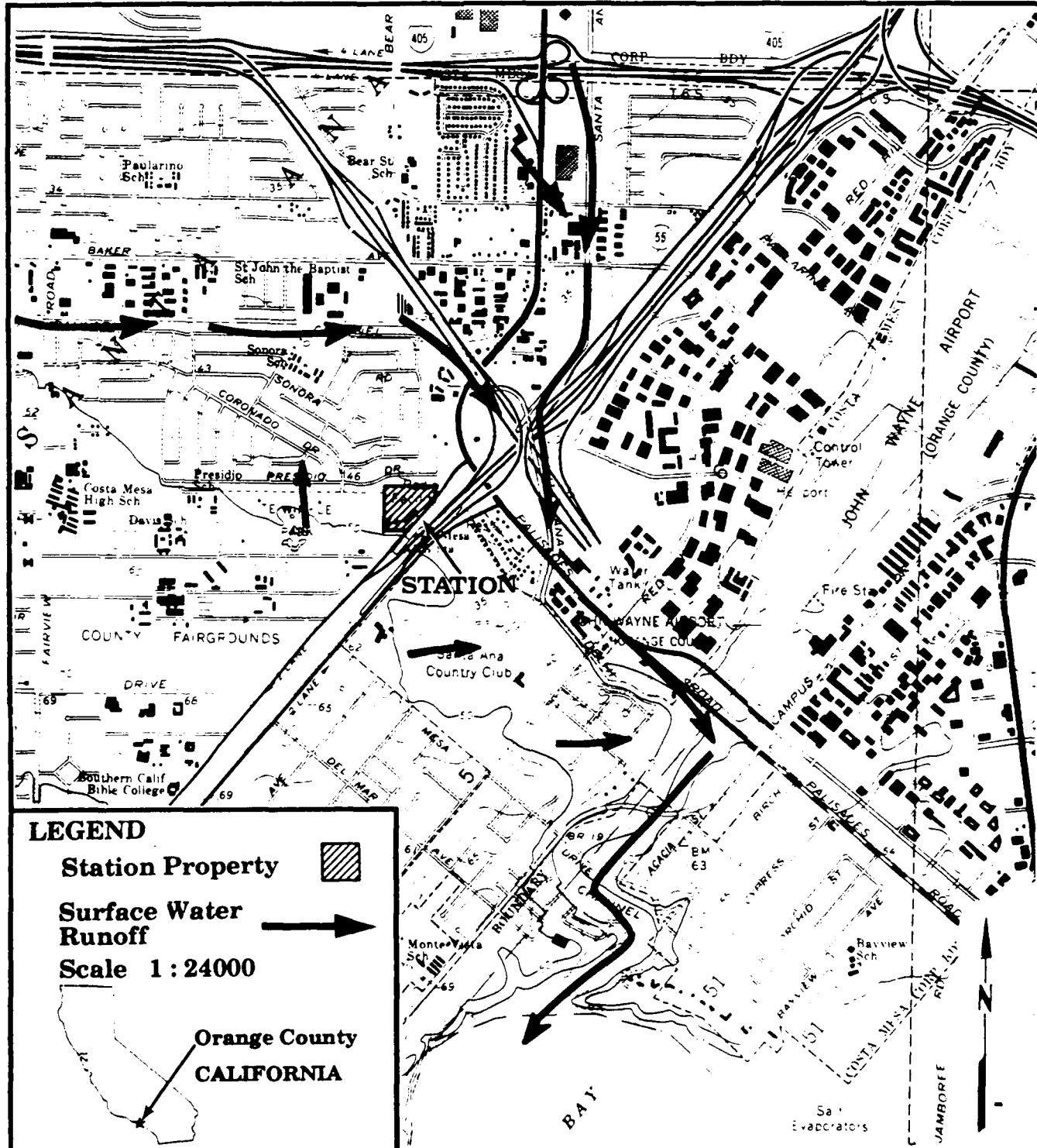
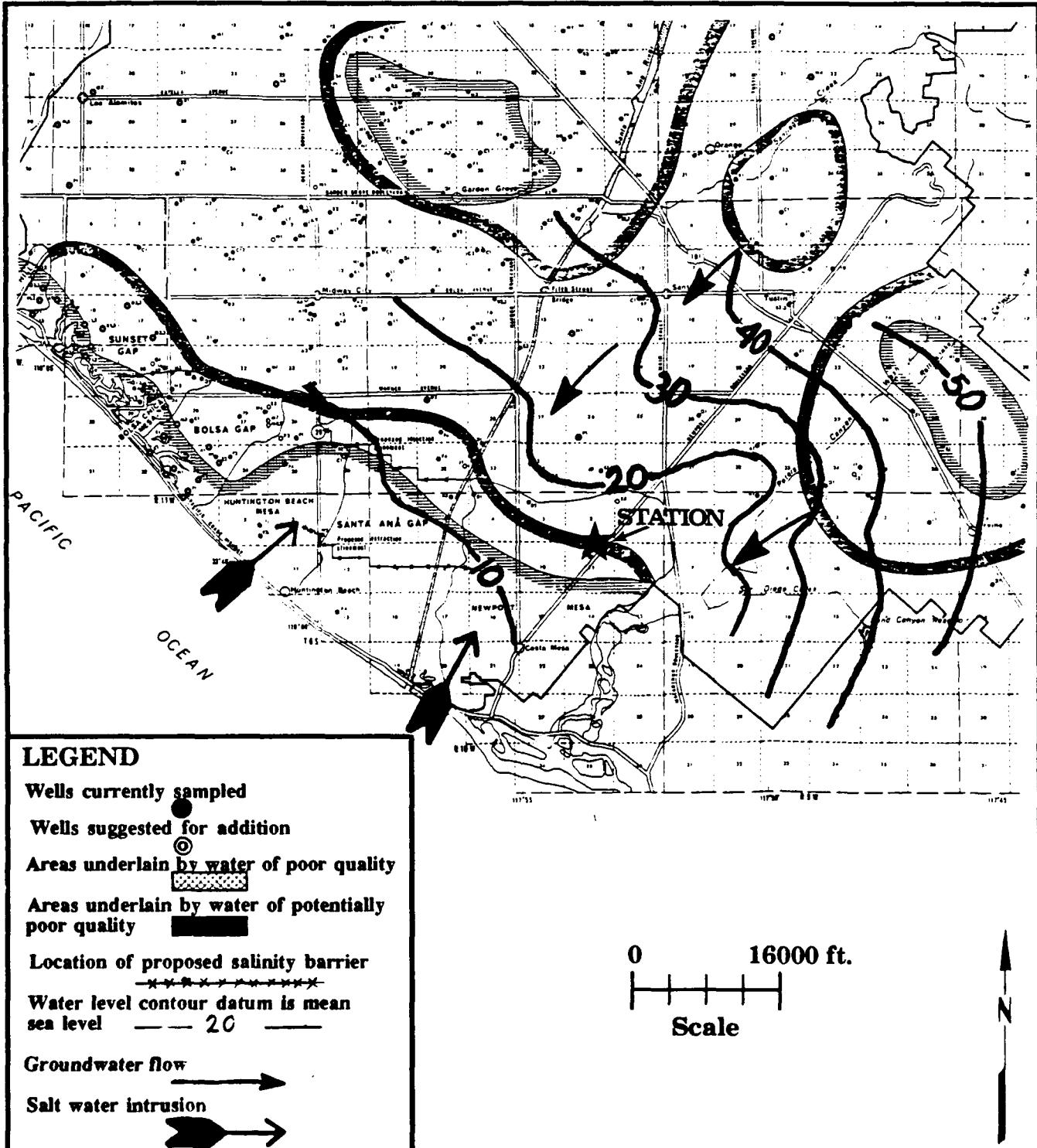


Figure III.6
Surface Water Runoff Route Map of the Area



SOURCE: Moreland, et al., 1969.

Figure III.7
Altitude of Pleistocene Aquifer
Water Levels, Water Quality, and Well Locations

Natural Communities

Southern Coastal Salt Marsh (NC52120)
South Eusaline Lagoon (NCM2141)Floral

Flora

Dudleya stolonifera (SPLAEL0) - Laguna Beach Dudleya
Coraylanthus maritimus ssp *maritimus* (SPNPQ81) - Salt Marsh Bird's-Beak

Fauna

Rallus longirostris levipes (SADMK 90) - Light Footed Clapper Rail
Laterallus jamaicensis coturniculus (SADMK 92) - California Black Rail
Sterna antillarum browni (SADSK 94) - California Least Tern
Cicindela gabbi (SAJFP 42) - Tiger Beetle

Note: The NDDB is a computerized inventory of information on the location and condition of California's rare and threatened animals, plants and natural communities. A seven-character code is assigned to each listing. The first two letters include Element Class:

SA = Special Animals
SP = Special Plants
NC = Natural Communities

The remaining five characters give each specie or community a unique code for data management.

IV. SITE EVALUATION

A. Activity Review

A review of Station records and interviews with personnel were used to identify specific operations in which the majority of hazardous materials and/or hazardous wastes are used, stored, disposed of, and processed. Table IV.1 provides a history of waste generation and disposal for operations conducted by shops at the Station. If an item is not listed on the table on a best-estimated basis, that activity or operation produces negligible (less than 1 gallon/year) waste requiring disposal.

Fresh product diesel fuel and MOGAS have been stored in underground storage tanks at the Station. In addition, tank trucks and fuel trailers parked at the Station are used to store fuels. The 222nd CCSQ generates hazardous wastes primarily through vehicle and aerospace ground equipment (AGE) maintenance operations. However, the Station has experienced no significant spills and no wastes have been disposed on the ground. Through the years hazardous wastes have been disposed of either through a contractor or the DRMO at El Toro.

The potable water supply and sanitary sewer service for the Station is provided by the City of Costa Mesa Water District. No water wells are present within the Station's boundaries.

B. Disposal/Spill Site Information, Evaluation, and Hazard Assessment

Eleven persons were interviewed to identify and locate potential sites that may have been contaminated by hazardous wastes as a result of past Station operations. The interviews were followed by visual field examinations of the Station. No potentially contaminated sites were identified through the inspection of the Station or through the interviews.

C. Other Pertinent Facts

- o Trash and non-hazardous solid wastes are disposed of by a contractor.
- o There is no Polychlorinated Biphenyl (PCB) electrical equipment at the Station.
- o There are two abandoned underground tanks at the Station. A 5000-gallon diesel and a 2000-gallon unleaded gasoline tank failed leak tests

Table IV.1

Hazardous Materials/Hazardous Wastes Disposal Summary: Costa Mesa Air National Guard Station, Costa Mesa, California.

Shop Name and Location	Vehicle Maintenance (Bldg. 2)	Possible Hazardous Wastes	Estimated Quantities (Gallons/Year)	Method of Disposal		
				1964	1970	1980
Safety Kleen		Engine Oil	250	CONTR/DRMO		
	PD-680		175		CONTR/DRMO	
	Sulfuric Acid		250			NLU
	Ethylene Glycol		100	SAN	NSAN	DRMO
	Lubricating Oil		20		CONTR/DRMO	
	Hydraulic Oil		100		CONTR/DRMO	
	Transmission Fluid		40		CONTR/DRMO	
	Paint Thinner		100		CONTR/DRMO	
	Brake Fluid		10		CONTR/DRMO	
	Grease (bearing)		15		CONTR/DRMO	
				NIU		CONTR

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CONTR - Disposed of through a Contractor.
 DRMO - Disposed of through the Defense Reutilization & Marketing Office. (Prior to 1986, this office was known as the Defense Property Disposal Office (DPDO).)
 NIU - Material not in use.
 NLU - Material no longer used.
 NSAN - Material neutralized and disposed of through the sanitary sewer system.
 PROC - Material used up in process (ie. evaporation).
 SAN - Disposed of through the sanitary sewer.
 TRASH - Disposed of in trash which goes to City landfill.
 WASH - Disposed down drains at washrack during washing operations. Water at the washrack drains into an oil/water separator and then into the sanitary sewer.

Table IV-1

**Hazardous Materials/Hazardous Wastes Disposal Summary: Costa Mesa Air
National Guard Station, Costa Mesa, California (continued).**

Shop Name and Location	Possible Hazardous Wastes	Estimated Quantities (Gallons/Year)	Method of Disposal			
			1964	1970	1980	1990
Aerospace Ground Equipment (AGE) Maintenance (Bldg. 2)	Engine Oil	480			CONTR/DRMO	
	Hydraulic Oil	50			CONTR/DRMO	
	Strippers/Thinners	20			CONTR/DRMO	
	Parts Cleaner	24 aerosol cans			PROC/TRASH	
	Gasoline	55		SAN	NSAN	DRMO
	Battery Acid	100				WASH
	Cleaning Compound	110				
	MEK	20			PROC/TRASH	NLU
	Stoddard Solvent	50			CONTR/DRMO	NLU
	Safety Kleen	50			NIU	CONTR
	Diesel Fuel	55			CONTR/DRMO	
	Enamel Paint	15			CONTR/DRMO	

KEY:

- CONTR - Disposed of through a Contractor.
- DRMO - Disposed of through the Defense Reutilization & Marketing Office. (Prior to 1986, this office was known as the Defense Property Disposal Office (DPDO).)
- NIU - Material not in use.
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- SAN - Disposed of through the sanitary sewer.
- TRASH - Disposed of in trash.
- WASH - Disposed down drains at washrack during washing operations. Water at the washrack drains into an oil/water separator and then into the sanitary sewer.

in 1989. Shortly thereafter, these tanks were pumped dry and abandoned. Requests have been made to have these tanks replaced as soon as funding is available. Interviewees reported that these tanks were tested in 1980 and again in 1985. These tests indicated that the tanks were not leaking prior to 1985.

- o There is an oil/water separator at the washrack. This separator is connected to the city sewer and is pumped as needed.
- o The Station is not required to have a National Pollutant Discharge Elimination System (NPDES) permit.

V. CONCLUSIONS

Information obtained through interviews with eleven Station personnel, reviews of Station records, and field observations identified no contaminated disposal and/or spill sites on Station property.

VI. RECOMMENDATIONS

No further IRP investigation is recommended for the Station.

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GLOSSARY OF TERMS

ALLUVIAL - Pertaining to or composed of alluvium or deposited by a stream or running water.

ALLUVIAL FAN - An outspread, gently sloping mass of alluvium deposited by a stream, especially in an arid or semiarid region where a stream issues from a narrow canyon onto a plain or valley floor.

ANNUAL PRECIPITATION - The total amount of rainfall and snowfall for the year.

AQUIFER - A water-bearing layer of rock that will yield water in a usable quantity to a well or spring.

ARGILLACEOUS - Like or containing clay.

ARKOSE - A feldspar rich sandstone, typically coarse-grained and pink or reddish, that is composed of angular to subangular grains that may be either poorly or moderately well-sorted, is usually derived from the rapid disintegration of granite or granitic rocks, and often closely resembles granite.

BASIN - (a) A depressed area with no surface outlet; (b) A drainage basin or river basin; (c) A low area in the Earth's crust, of tectonic origin, in which sediments have accumulated.

BAY - A wide, curving open indentation, recess, or inlet of a sea or lake into the land or between two capes or headlands, larger than a cove, and usually smaller than, but of the same general character as a gulf.

BED [stratig] - The smallest formal unit in the hierarchy of lithostratigraphic units. In a stratified sequence of rocks it is distinguishable from layers above and below. A bed commonly ranges in thickness from a centimeter to a few meters.

BEDDING [stratig] - The arrangement of sedimentary rock in beds or layers of varying thickness and character.

BEDROCK - A general term for the consolidated (solid) rock that underlies soil or other unconsolidated superficial material. See HORIZON [soil] - *R* layer.

BERM - A ledge or space between the ditch and parapet in a fortification.

CLASTIC - Rock or sediment composed principally of fragments derived from pre-existing rocks or minerals and transported some distance from their place of origin.

CLAY [soil] - A rock or mineral particle in the soil having a diameter less than 0.002 mm (2 microns).

CLAY [geol] - A rock or mineral fragment or a detrital particle of any composition smaller than a fine silt grain, having a diameter less than 1/256 mm (4 microns).

COARSE-TEXTURED (light textured) **SOIL** - Sand or loamy sand.

CONE OF DEPRESSION - The depression of heads around a pumping well caused by the withdrawal of water.

CONGLOMERATE - A coarse-grained sedimentary rock, composed of rounded pebbles, cobbles, and boulders, set in a fine-grained matrix of sand or silt, and commonly cemented by calcium carbonate, iron oxide, silica, or hardened clay.

CONSOLIDATION - Any process whereby loosely aggregated, soft, or liquid earth materials become firm and coherent rock; specif. the solidification of a magma to form an igneous rock, or the lithification of loose sediments to form a sedimentary rock.

CONTAMINANT - As defined by Section 101(f)(33) of Superfund Amendments and Reauthorization Act of 1986 (SARA) shall include, but not be limited to any element, substance, compound, or mixture, including disease-causing agents, which after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction), or physical deformation in such organisms or their offspring; except that the term "contaminant" shall not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under:

- (a) any substance designated pursuant to Section 311(b)(2)(A) of the Federal Water Pollution Control Act,
- (b) any element, compound, mixture, solution, or substance designated pursuant to Section 102 of this Act,
- (c) any hazardous waste having the characteristics identified under or listed pursuant to Section 3001 of the Solid Waste Disposal Act (but not including any waste the regulation of which under the Solid Waste Disposal Act has been suspended by Act of Congress),
- (d) any toxic pollutant listed under Section 307(a) of the Federal Water Pollution Control Act,

- (e) any hazardous air pollutant listed under Section 112 of the Clean Air Act, and
- (f) any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to Section 7 of the Toxic Substance Control Act;

and shall not include natural gas, liquefied natural gas, or synthetic gas of pipeline quality (or mixtures of natural gas and such synthetic gas).

CONTEMPORANEOUS FAULT - See GROWTH FAULT.

CREEK - A term generally applied to any natural stream of water, normally larger than a brook but smaller than a river.

CRITICAL HABITAT - The specific areas within the geographical area occupied by the species on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management consideration or protection.

DEPOSITS - Earth material of any type, either consolidated or unconsolidated, that has accumulated by some natural process or agent.

DIABASE - An intrusive rock whose main components are labradorite and pyroxene and which is characterized by ophitic texture.

DIORITE - A group of igneous rocks composed of dark-colored amphibole (esp. hornblende) oligoclase, andesine, pyroxene, and small amounts of quartz; the intrusive equivalent of andesite.

DRAINAGE CLASS (natural) - Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained - Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained - Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well-drained - Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does

not inhibit growth of roots for significant periods during most growing seasons. Well-drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained - Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained - Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained - Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough periods during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained - Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

DRAINAGEWAY - A channel or course along which water moves in draining an area.

DRAWDOWN - The reduction in head at a point caused by the withdrawal of water from an aquifer.

EMBAYMENT - A downwarped region of stratified rocks that extends into a region of other rocks.

ENDANGERED SPECIES - Any species which is in danger of extinction throughout all or a significant portion of its range, other than a species of the Class Insecta determined by the secretary to constitute a pest whose protection would present an overwhelming and overriding risk to man.

EROSION - The general process or the group of processes whereby the materials of the Earth's crust are loosened, dissolved, or worn away, and simultaneously moved from one place to another by natural agencies, but usually exclude mass wasting.

EUGEOSYNCLINAL - Like a geosyncline in which volcanism is associated with clastic sedimentation.

EUSALINE - Sodium chloride concentrations of 30 to 35 parts per thousand. Same as normal sea water.

FAULT - A fracture or fracture zone along which there has been displacement of the sides relative to one another parallel to the fracture.

FELDSPAR - Any of several crystalline minerals made up of Aluminum silicates with sodium, potassium, or calcium; most widespread of any mineral group and constitute 60% of the earth's crust; occur in all types of rock.

FELDSPATHIC - Like or as feldspar.

FINE-GRAINED - Said of a soil in which silt and/or clay predominate.

FINE-TEXTURED (heavy textured) SOIL - Sandy clay, silty clay, and clay.

FLOOD PLAIN - The surface or strip of relatively smooth land adjacent to a river channel, constructed by the present river in its existing regimen and covered with water when the river overflows its banks.

FOLD [geol struc] - A curve or bend of a planar structure such as rock strata, bedding planes, foliation or cleavage.

FORMATION - A lithologically distinctive, mappable body of rock.

FRACTURE [struc geol] - A general term for any break in a rock, whether or not it causes displacement, due to mechanical failure by stress. Fracture includes cracks, joints, and faults.

GABBRO - A group of dark-colored, basic intrusive igneous rocks composed principally of basic plagioclase and clinopyroxene, with or without olivine and othoxypyrene; approximate intrusive equivalent of basalt.

GEOLOGIC TIME - See Figure G1.1.

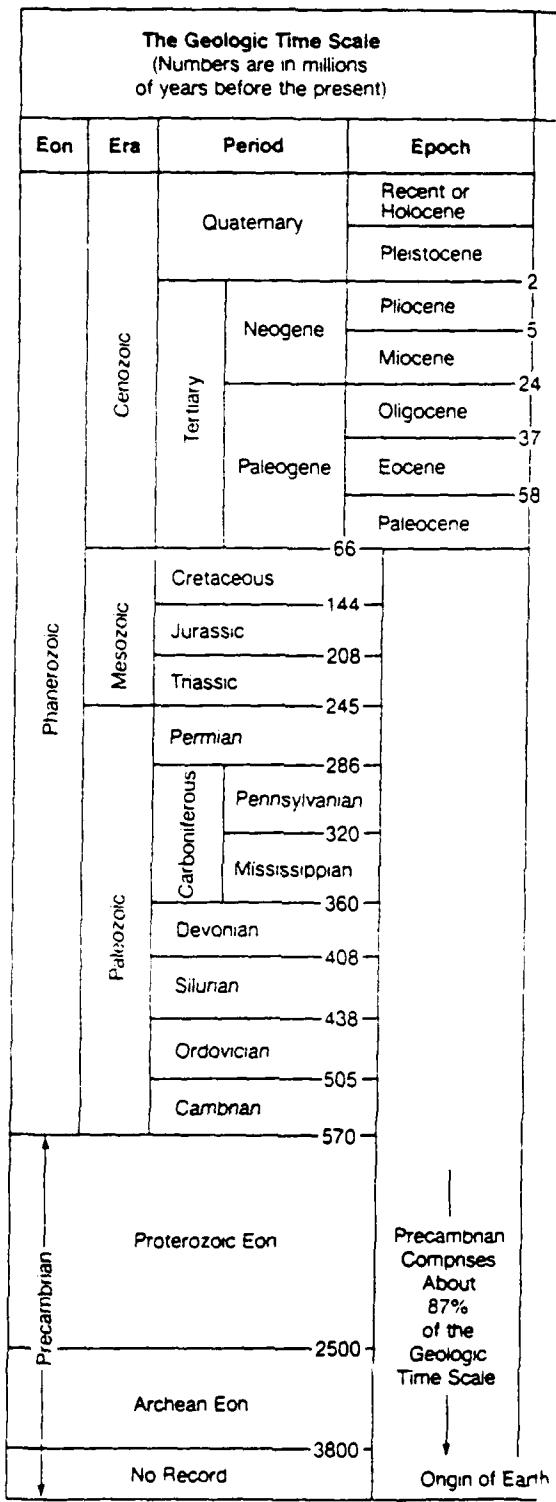


Figure GI.1
The Geologic Time Scale

GNEISS - A coarse-grained, foliated rock produced by regional metamorphism; commonly feldspar- and quartz-rich.

GRANITE - Broadly applied, any crystalline, quartz-bearing plutonic rock; also commonly contains feldspar, mica, hornblende, or pyroxene.

GRANODIORITE - A group of coarse-grained plutonic rocks intermediate in composition between quartz diorite and quartz monzonite, containing quartz, plagioclase, and potassium feldspar with biotite, hornblende, or more rarely, pyroxene, as the mafic contents.

GRAVEL - An unconsolidated, natural accumulation of rounded rock fragments resulting from erosion, consisting predominantly of particles larger than sand, such as boulders, cobbles, pebbles, granules or any combination of these fragments.

GRAYWACKE - A non-porous, dark-colored sandstone containing angular grains and fragments of other rocks; a fine-grained conglomerate resembling sandstone.

GROUNDWATER - Water in the saturated zone that is under a pressure equal to or greater than atmospheric pressure.

GROWTH FAULT - A fault in sedimentary rock that forms contemporaneously and continuously with deposition, so that the displacement (throw) increases with depth and the strata of the downthrown side are thicker than the correlative strata of the upthrown side.

HAS - Hazard Assessment Score - The score developed by using the U.S. Air Force Hazard Assessment Rating Methodology.

HAZARDOUS MATERIAL - Any substance or mixture of substances having properties capable of producing adverse effects on the health and safety of the human being. Specific regulatory definitions also found in OSHA and DOT rules.

HAZARDOUS WASTE - A solid or liquid waste that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

- a. cause, or significantly contribute to, an increase in mortality or an increase in serious or incapacitating reversible illness, or
- b. pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

HEAD - See TOTAL HEAD.

HERBICIDE - A weed killer.

HIGHLAND - A general term for a relatively large area of elevated or mountainous land standing prominently above adjacent low areas; and mountainous region.

HILL - A natural elevation of the land surface, rising rather prominently above the surrounding land, usually of limited extent and having a well-defined outline (rounded) and generally considered to be less than 1000 feet from base to summit.

HORIZON [soil] - A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon - An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon - The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon - A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon - The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon - The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer - Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

HORST - An elongate, relatively uplifted crustal unit or block that is bounded by faults on its long side.

IGNEOUS ROCKS - Rock or mineral that has solidified from molten or partially molten material, i.e. from magma.

INTERBEDDED - Beds lying between or alternating with others of different character; especially rock material laid down in sequence between other beds.

LOAM - A rich, permeable soil composed of a friable mixture of relatively equal proportions of sand, silt, and clay particles, and usually containing organic matter.

LOWLAND - A general term for low-lying land or an extensive region of low land, esp. near the coast and including the extended plains or country lying not far above tide level.

MEANDERBELT - The zone along a valley floor across which a meandering stream shifts its channel from time to time.

MEAN LAKE EVAPORATION - The total evaporation amount for a particular area; amount based on precipitation and climate (humidity).

MEAN SEA LEVEL - The average height of the surface of the sea for all stages of the tide over a 19-year period.

MESA - A table-land; a flat-topped mountain or plateau bounded on at least one side by a steep cliff.

METAMORPHIC ROCK - Any rock derived from pre-existing rocks by mineralogical, chemical, and/or structural changes, essentially in solid state, in response to marked changes in temperature, pressure, shearing stress, and chemical environment, generally at depth in the Earth's crust.

MIGRATION (Contaminant) - The movement of contaminants through pathways (groundwater, surface water, soil, and air).

MINERAL - A naturally occurring inorganic element or compound having an orderly internal structure and characteristic chemical composition, crystal form and physical properties.

MONTMORILLONITE - A clay mineral of the smectite group comprising expanding-lattice clay minerals when wetted.

MONZONITE - Plutonic rock intermediate in composition between syenite and diorite, containing approximately equal amounts of alkali feldspar and plagioclase.

MOTTLED [soil] - a soil that is irregularly marked with spots or patches of different colors, usually indicating poor aeration or seasonal wetness.

NET PRECIPITATION - Precipitation minus evaporation.

ORTHOCLASE - See FELDSPAR.

OUTCROP - That part of a geologic formation or structure that appears at the surface of the Earth; also, bedrock that is covered only by surficial deposits such as alluvium.

OVERTURNED - Said of a fold or the limb of a fold, that has tilted beyond the perpendicular. Sequence of strata thus appears reversed.

PD-680 - A cleaning solvent composed predominately of mineral spirits; Stoddard solvent.

PEAT - An unconsolidated deposit of semicarbonized plant remains in a water-saturated environment and of persistently high moisture content (at least 75%).

PERMEABILITY - The capacity of a porous rock, sediment, or soil for transmitting a fluid without impairment of the structure of the medium; it is a measure of the relative ease of fluid flow under unequal pressure - see SOIL PERMEABILITY.

POND - A natural body of standing fresh water occupying a small surface depression, usually smaller than a lake and larger than a pool.

POROSITY - The voids or openings in a rock. Porosity may be expressed quantitatively as the ratio of the volume of openings in a rock to the total volume of the rock.

POTENTIOMETRIC SURFACE - A surface that represents the total head in an aquifer; that is, it represents the height above a datum plane at which the water level stands in tightly cased wells that penetrate the aquifer.

QUARTZ - A crystalline silica, an important rock forming mineral: SiO_2 . Occurs either in transparent hexagonal crystals (colorless or colored by impurities) or in crystalline or crystalline masses. Forms the major proportion of most sands and has a widespread distribution in igneous, metamorphic and sedimentary rocks.

QUARTZITE [meta] - A granoblastic metamorphic rock consisting mainly of quartz and formed by recrystallization of sandstone or chert by either regional or thermal metamorphism.

RIVER - A general term for a natural freshwater surface stream of considerable volume and a permanent or seasonal flow, moving in a definite channel toward a sea, lake, or another river.

SALINE [adj] - Salty; containing dissolved sodium chloride.

SAND - A rock or mineral particle in the soil, having a diameter in the range 0.52 - 2 mm.

SANDSTONE - A medium-grained fragmented sedimentary rock composed of abundant round or angular fragments of sand, size set in a fine-grained matrix (silt or clay) and more or less firmly united by a cementing material (commonly silica, iron oxide, or calcium carbonate).

SANDY LOAM - A soil containing 43 - 85% sand, 0 - 50% silt, and 0 - 20% clay, or containing at least 52% sand and no more than 20% clay and having the percentage of silt plus twice the percentage of clay exceeding 30% or containing 43 - 52% sand, less than 50% silt, and less than 7% clay.

SATURATED ZONE - The subsurface zone in which all openings are full of water.

SCHIST - A medium- or coarse-grained, strongly foliated, crystalline rock; formed by dynamic metamorphism.

SEDIMENT - Solid fragmental material that originates from weathering of rocks and is transported or deposited by air, water, or ice, or that accumulates by other natural agents, such as chemical precipitation from solution or secretion by organisms, and that forms in layers on the Earth's surface at ordinary temperatures in a loose, unconsolidated form; (b) strictly solid material that has settled down from a state of suspension in a liquid.

SEDIMENTARY ROCK - A rock resulting in the consolidation of loose sediment that has accumulated in layers; e.g., a clastic rock (such as conglomerate or tillite) consisting of mechanically formed fragments of older rock transported from its source and deposited in water or from air or ice; or a chemical rock (such as rock salt or gypsum) formed by precipitation from solution; or an organic rock (such as certain limestones) consisting of the remains or secretions of plants and animals.

SHALE - A fine-grained detrital sedimentary rock, formed by the consolidation (especially by compression) of clay, silt, or mud.

SIALIC - Like the light, granitic rock material near the surface of the earth's crust, underlying the continents.

SILT [soil] - (a) A rock or mineral particle in the soil, having a diameter in the range 0.002-0.005 mm; (b) A soil containing more than 80% silt-size particles, less than 12% clay, and less than 20% sand.

SILT LOAM - A soil containing 50 - 88% silt, 0 - 27% clay and 0 - 50% sand.

SOIL - The layer of material at the land surface that supports plant growth.

SOIL PERMEABILITY - The characteristic of the soil that enables water to move downward through the profile. Permeability is measured as the distance per unit time that water moves downward through the saturated soil.

Terms describing permeability are:

Very Slow	-	less than 0.06 inches per hour (less than 4.24×10^{-5} cm/sec)
Slow	-	0.06 to 0.20 inches per hour (4.24×10^{-5} to 1.41×10^{-4} cm/sec)
Moderately Slow	-	0.20 to 0.63 inches per hour (1.41×10^{-4} to 4.45×10^{-4} cm/sec)
Moderate	-	0.63 to 2.00 inches per hour (4.45×10^{-4} to 1.41×10^{-3} cm/sec)
Moderately Rapid	-	2.00 to 6.00 inches per hour (1.41×10^{-3} to 4.24×10^{-3} cm/sec)
Rapid	-	6.00 to 20.00 inches per hour (4.24×10^{-3} to 1.41×10^{-2} cm/sec)
Very Rapid	-	more than 20.00 inches per hour (more than 1.41×10^{-2} cm/sec)

(Reference: United States Department of Agriculture, Soil Conservation Service)

SOIL REACTION - The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests at pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as:

pH

Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

SOIL STRUCTURE - See STRUCTURE [soil].

SOLUM - The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum. See HORIZON [soil].

SOLVENT - A substance, generally a liquid, capable of dissolving other substances.

STRAND PLAIN - A prograded shore built seaward by waves and currents, and continuous for some distance along the coast.

STRATIFIED - Formed, arranged, or laid down in layers or strata; especially said of any layered sedimentary rock or deposit.

STRIKE - SLIP FAULT - A fault on which the movement is parallel to the fault's strike. See TRANSCURRENT FAULT.

STRUCTURE [soil] - The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are - platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

SUBSIDENCE - Sinking or downward settling of the earth's surface, not restricted in rate, magnitude, or area involved.

SUBSOIL - Technically, the B horizon; roughly, the part of the solum below plow depth.

SUBSOILING - Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

SUBSTRATUM - The part of the soil below the solum.

SURFACE WATER - All water exposed at the ground surface, including streams, rivers, ponds, and lakes.

SYENITE - Plutonic rock containing orthoclase and microcline with small amounts of plagioclase feldspar.

SYNCLINORIUM - A composite synclinal structure of regional extent composed of lesser folds.

TERRACE [geomorph] - Any long, narrow, relatively level or gently inclined surface, generally less broad than a plain, bounded along one edge by a steeper descending slope and along the other by a steeper ascending slope.

TERRACE [soil] - A horizontal or gently sloping ridge or embankment of earth built along the contours of a hillside for the purpose of conserving moisture, reducing erosion, or controlling runoff.

TERRIGENOUS DEPOSITS - Shallow marine sediment consisting of material eroded from the land surface.

THREATENED SPECIES - Any species which is likely to become an endangered species within the foreseeable future throughout all or significant portion of its range.

TIME [geol] - See Figure G1.1.

TOPOGRAPHY - The general conformation of a land surface, including its relief and the position of its natural and man-made features.

TOTAL HEAD - The height above a datum plane of a column of water. In a groundwater system, it is composed of elevation head, pressure head, and velocity head.

TRANSCURRENT FAULT - A large scale strike - slip fault in which the fault surface is steeply inclined.

UNCONSOLIDATED - (a) Sediment that is loosely arranged or unstratified, or whose particles are not cemented together, occurring either at the surface or at depth. (b) Soil material that is in a loosely aggregated form.

UNDULATING [geomorph] - (a) A landform having a wavy outline or form. (b) A rippling or scalloped land surface, having a wavy outline or appearance.

VALLEY - Any low-lying land bordered by higher ground, especially an elongate, relatively large, gently sloping depression of the earth's surface, commonly situated between two mountains or between ranges of hills and mountains, and often containing a stream or river with an outlet. It is usually developed by stream or river erosion, but can be formed by faulting.

WATER TABLE - The level in the saturated zone at which the pressure is equal to the atmospheric pressure.

WETLANDS - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

WILDERNESS AREA - An area unaffected by anthropogenic activities and deemed worthy of special attention to maintain its natural condition.

Appendix A

Outside Agency Contact List

OUTSIDE AGENCY CONTACT LIST

- 1) California Department of Water Resources
849 South Broadway, Suite 500
P.O. Box 6598
Los Angeles, CA 90055
(213) 620-4148
- 2) City of Costa Mesa
Developmental Services Department
Division of Building and Safety
77 Fair Drive
Costa Mesa, CA 92628-1200
Burt D. Morgan
(714) 754-5608
- 3) City of Costa Mesa
Water District
1965 Palcentia Avenue
Costa Mesa, CA 92627
(714) 631-1200
- 4) Department of Water Resources
Central District
3251 South Street
Sacramento, CA 95816-70117
Howard L. Mann, Chief
Surface and Ground Water Data Section
- 5) Department of Water Resources
P.O. Box 6598
Los Angeles, CA 90055
(213) 620-4203
- 6) State of California
Department of Fish and Game
P.O. Box 944290
Sacramento, CA 94244-2090
(916) 324-3812

OUTSIDE AGENCY CONTACT LIST (continued)

7) State of California
Resources Agency
Department of Conservation
California Division of Mines and Geology
P.O. Box 2980
Sacramento, CA 95812
Karen Fleming
(916) 324-3812

8) State of California
Resources Agency
Department of Water Resources
P.O. Box 942836
Sacramento, CA 94236-0001

9) State of California
Water Resources Division
849 South Broadway
Los Angeles, CA 90014
(213) 620-4107

10) Timely Discount Topos Inc.
9769 West 119th Drive, Suite 9
Broomfield, Colorado 80020
(303) 469-5022

11) United States Department of Agriculture
Soil Conservation Service
65 Quinta Court, Suite C
Sacramento, CA 95823
(916) 682-7844

12) United States Department of Agriculture
Soil Conservation Service
805 West Avenue J
Lancaster, CA 93534
Richard Campbell
(805) 945-2604

13) United States Department of Commerce
National Oceanic and Atmospheric Administration
Environmental Data and Information Service
National Climatic Center
Asheville, NC 28801
(704) 259-0871

OUTSIDE AGENCY CONTACT LIST (continued)

- 14) United States Geological Survey
Books and Open File Reports Section
F.O. Box 25425 DFC, Building 810
Denver, CO 80225
- 15) United States Geological Survey
300 North Los Angeles Street
Los Angeles, CA 90012
Dianne Noserale
(213) 894-2850
- 16) United States Geological Survey
Water Resources Division
California District
2800 Cottageway, Room W-2235
Sacramento, CA 95825
Jean F. Lucas
(916) 978-4668
- 17) United States Geological Survey
745 Middle Field Road
Mail Stop 532
Menlow Park, CA 94025